



Australian Government

MSL974026 Perform tests to determine the properties of construction materials

Release: 1

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Modification History

Release	Comments
Release 1	This version was released in <i>MSL Laboratory Operations Training Package Release 2.0</i>. Supersedes and equivalent to MSL974012 Perform tests to determine the properties of construction materials. Foundation skill information added. Range of conditions removed. Assessment requirements amended.

Application

This unit of competency describes the skills and knowledge to conduct multi-stage tests to determine the properties of raw and/or manufactured construction materials. These test results are typically used by clients to prove raw material deposits, tender for supply of construction materials, classify soils, determine the suitability of construction materials for specialised uses and to inform the design of civil engineering works. The unit includes data processing and interpretation of results to identify obvious errors or unexpected results and take corrective action. However, personnel are not required to analyse data, optimise test methods or workplace procedures for specific samples or troubleshoot equipment problems where the solution is not apparent.

This unit of competency applies to laboratory personnel working in the geotechnical and construction material testing industry sectors who conduct tests in consulting laboratories or laboratories at extractive, manufacturing or construction sites using established test methods. These tests (such as load bearing ability, creep, shrinkage, durability, plasticity, permeability, chloride diffusion and reactivity) are used to determine the properties of aggregates, concrete, soils, road pavement or other specialised construction materials and products.

No licensing or certification requirements exist at the time of publication. However, regulations and/or external accreditation requirements for laboratory operations exist, so local requirements should be checked. Relevant legislation, industry standards and codes of practice within Australia must also be applied.

Pre-requisite Unit

MSL973022 Conduct laboratory-based acceptance tests for construction materials

Competency Field

Testing

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

- | | |
|---|--|
| 1 Interpret and schedule test requirements | <ul style="list-style-type: none">1.1 Access relevant job instructions from laboratory information management system (LIMS)1.2 Interpret test request to confirm samples to be tested, the test method and equipment involved1.3 Identify hazards and workplace controls associated with the sample, preparation methods, reagents and/or equipment1.4 Assemble all required equipment and materials1.5 Plan work sequences for optimum efficiency and/or throughput of multiple samples |
| 2 Prepare samples or test pieces | <ul style="list-style-type: none">2.1 Retrieve samples and/or test pieces from storage and record their general appearance2.2 Check the accuracy and completeness of accompanying labels and documentation to ensure traceability2.3 Check that the storage/curing conditions of samples and/or test pieces were appropriate2.4 Compare samples and/or test pieces with test specifications, record observations and report discrepancies2.5 Prepare samples and/or test pieces in accordance with appropriate test method2.6 Conduct preliminary measurements to establish initial dimensions and test conditions as necessary |
| 3 Check test equipment before | <ul style="list-style-type: none">3.1 Set up test equipment/instruments in accordance with test method |

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
	use	3.2	Perform pre-use and safety checks in accordance with workplace procedures
		3.3	Identify faulty or unsafe equipment/instruments and report to appropriate personnel
		3.4	Check calibration status of instruments and report any out-of-calibration items to appropriate personnel
4	Conduct test to determine sample properties	4.1	Perform each treatment/measurement stage of the test method precisely and in the correct sequence
		4.2	Record all data, observations and any factors that may impact on the quality of results
		4.3	Recognise obvious errors or atypical data and take appropriate corrective actions
		4.4	Seek advice to deal with any situation beyond own technical competence
		4.5	Shut down test equipment/instruments in accordance with workplace procedures
5	Process and interpret data	5.1	Check data for accuracy and completeness
		5.2	Perform required calculations and ensure results are consistent with expected values for the sample type
		5.3	Record and report results with the appropriate accuracy, precision and units
		5.4	Interpret trends in data and/or results and report out of specification or unexpected results promptly to appropriate personnel
		5.5	Determine if obvious procedure or equipment problems have led to unexpected data or results
6	Maintain	6.1	Enter approved data and test results into LIMS

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

laboratory records	6.2	Maintain confidentiality and security of workplace information and test results
	6.3	Maintain technical/administrative records and test reports in accordance with workplace procedures
7 Maintain a safe work environment	7.1	Use safe work procedures and personal protective equipment (PPE) to ensure personal safety and that of others
	7.2	Minimise generation of wastes and environmental impacts of testing
	7.3	Collect and/or dispose of all waste in accordance with environmental/quarantine requirements and workplace procedures
	7.4	Care for and store equipment, used test pieces and back-up samples in accordance with workplace procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

- Numeracy skills to:
 - estimate and calculate scientific quantities, such as stress, strain and stiffness
 - interpret gross features of data and graphs (e.g. Mohr circles) to make logical conclusions
 - identify atypical data, errors and unexpected results, trace any obvious causes and take corrective action

Other foundation skills essential to performance are explicit in the performance criteria of this unit.

Unit Mapping Information

Equivalent to MSL974012 Perform tests to determine the properties of construction materials, Release 1.

Links

MSL Laboratory Operations Companion Volume Implementation Guide is available from VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5c63a03b-4a6b-4ae5-9560-1e3c5f462baa>

Assessment Requirements for MSL974026 Perform tests to determine the properties of construction materials

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Performance Evidence

There must be evidence the candidate has completed the tasks outlined in the elements and performance criteria of this unit, and:

- safely prepared at least 3 different construction material laboratory samples or test pieces and conducting multi-stage tests on them to determine their properties, including:
 - accurately interpreting client's test requests, test methods, workplace procedures and safety information.

Knowledge Evidence

There must be evidence the candidate has knowledge of:

- relationship between properties and uses of construction materials
- details of construction materials test methods routinely used in job role, including:
 - purpose and principles of test
 - relationship between the properties and uses of construction materials
 - sample preparation procedures
 - key treatment/measurement stages
 - calculation steps to give results in appropriate units and precision
 - expected values for sample type
 - sources of uncertainty and methods for their control
- principles and concepts underpinning the test method
- principles and concepts related to equipment/instrument operation and testing, including the function of key components and effects on test of modifying variables
- pre-use checks and operating procedures for test equipment/instruments routinely used in job role
- basic equipment/method troubleshooting procedures

- common tests
- typical samples and test pieces:
 - samples of aggregates, soil, rock, concrete, road pavement and binders
 - disturbed and undisturbed samples
- corrective actions
- procedures for ensuring traceability of samples, test pieces, test data and results
- procedures for recording and reporting test results, calculations, test observations and unexpected or atypical results and equipment problems
- confidentiality requirements
- awareness of environmental sustainability issues as they relate to the work task
- legal, ethical and work health and safety (WHS) requirements specific to the work task.

Assessment Conditions

Skills must have been demonstrated in the workplace or in a simulated environment that reflects workplace conditions and contingencies. The following conditions must be met for this unit:

- use of suitable facilities, equipment and resources, including:
 - sample preparation and test equipment and materials specified in the test method
 - test methods and description of test set-up, data sets and technical/administrative records, and workplace procedures
 - calculator and/or computer and relevant software or laboratory information system.

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

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